

Price Development within the Milk Commodity Chain

Barbora Daňková, Ivana Blažková, Věra Bečvářová

Abstract: *The paper deals with the milk commodity chain and its price development during the years 2001-2016. The price development is monitored within the context of chosen countries (Germany, Austria, Slovakia and Poland). The paper uses descriptive statistics and basic indices describing monthly price development within the milk commodity chain between 2001-2016. Within the research of commodity chain prices there were analysed milk farm prices and producer prices of butter and Edam cheese in the given countries. Based on the obtained findings, the essential knowledge and conclusions connected with the entrance of the Czech Republic to the EU and with the dynamics of agribusiness development conditions resulting from globalizing world market were deduced. In general, it can be concluded that the price level on the dairy markets in the original EU member states and in the new EU member states has been balanced bilaterally. This aspect was reflected in a comparable price trends at the downstream market levels of the commodity chain under examination.*

Key words: Agribusiness · Price · Commodity Chain · Dairy Products

JEL Classification: Q13 · Q11

1 Introduction

Milk and dairy products are permanently for a long time one of the basic commodities in a human nutrition. Even the structure and volume of production and consumption differs in the world regions, there is no doubt that milk is always crucial commodity in argumentation of food security and sovereignty. Other verifiable argument for preservation or increase of size of herds of milking cows and milk production is the increase of world population affecting the world demand for food. FAO statistics show the human population growth of almost 2.5 billion between 1985-2015. World cow milk production is around 640 mil. t., overall, it is possible to tell that milk regional world diversification correspond current milk consumption. The biggest milk world producer is Europe (72 % of milk is produced in EU), then North and South America (mainly USA and Brazil) and in Asia there are determinative India and China. The evaluation of production shares of individual world region gives a cursory view of world production, from which it is not exactly possible to derive development and behaviour of crucial players, market position and development tendencies including ability and expansion possibilities inside of globalizing processes in the international markets, which affects different strategies and policy instruments in diverse power.

Significant increase of production is demonstrable in China and India, where there is for a longer time meaningful increase of domestic demand. Large countries, such as China and Russia, or many populous regions, such as central Asia, North Africa or part of South America, have not enough domestic production. These countries are known as the biggest world importers of milk. On the other hand, milk production in France and Germany is affected by the milk quotas, which must be kept by EU members. From 2015 the quotas were cancelled and EU milk market should be able to react better to demand changes. Quotas influenced the deal for individual EU members (origin and new) onto milk production in CAP EU, influenced total development of cow milk production as a basic product used in related production phases of commodity chain. Even the assumption about same rules and conditions of common EU market is accepted, the milk production is determined by other factors of regional development of individual countries. Price is one of these factors. Its development is one of the most important drivers of formation of the commodity chain, e.g. their production size or actual demand and supply. Nowadays, current milk price situation is very actual not only in the Czech Republic. To define the development of the price at particular levels of milk commodity chain in the Czech Republic, there is the need to have knowledge about relations between prices in other countries connected with the Czech Republic, because these countries and the their price development could determine prices in the Czech Republic.

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The specific characteristics of the agrarian market are reflected in the price formation of agricultural commodities. Common features of most commodity markets include market structure approaching perfect competition, very inelastic supply in a very short period and low elasticity in the short term, low price and income elasticity of demand (Tomek and Kaiser, 2014). According to Tomek and Kaiser (2014), pricing on agrarian markets largely depends on the possibility of production storage, and storage for pricing has the following impact. The market for non-stackable commodities has perfectly inelastic supply in very short period. According to the results of Lechanova and Bečvářová (2006) or Blažková and Dvoutělý (2017), the increase in the concentration of wholesalers and retailers creates disadvantageous conditions for processors who also seek to create greater concentration and interconnection to improve the bargaining power towards retail/wholesalers. These processes and the growing market power of the previous and subsequent stages become a dead end, from which companies try to get in the form of pooling and cooperation. Peltzman (2000) states that the following phenomenon has been observed in many sectors: the growth of input prices has been almost always reflected in the output price, however, decreases in input prices were followed by only partial decreases in output prices. Economists examining development of commodity verticals have recently focused on research of inter-segment price transmissions (e.g. Revoredo et al. 2004, McCorriston et al., 2001; McCorriston, 2002). According to McCorriston et al. (2001), the vertical price transmission in the individual commodity verticals will not be complete, if there is an imperfectly competitive environment.

Therefore, the further research should be focused on the price development and its tendencies, as well as the possibilities of connection between related countries. The information of this research topic help to understand the next level price analysis what can be e.g. price transmission on commodity chain. This type of research was conducted for example by Lloyd et al., (2009), Blažková and Syrovátka (2012), Dudova and Bečvářová (2015) or Royer (2011).

The above mentioned facts imply the focused of our paper, which is the milk commodity chain in the Czech Republic. The aim of the paper is to analyze the development of milk and dairy products prices in relations with the neighbouring countries of the Czech Republic. The paper quantifies basic development tendencies of prices and the price effects on the milk commodity chain.

2 Methods

Evaluation of the price environment is based on the farm price of milk (FP) and processor prices (PP) of butter and Edam cheese. The paper uses monthly prices in the time period 2001-2016. The prices are evaluated with the use of the base indices (the base year 2001 = 1.00). For the next comparison it was used the base index, where the basic measure is 1.00 = German monthly price of a concrete market (milk, butter, Edam). Prices are obtained from the database Eurostat and are denominated in Euro for all commodity chain levels and all products (FP, PP, milk, butter and Edam). Therefore, it is possible to evaluate the differences connected with manners and policy of final parts of commodity chain, e.g. some state interventions differences.

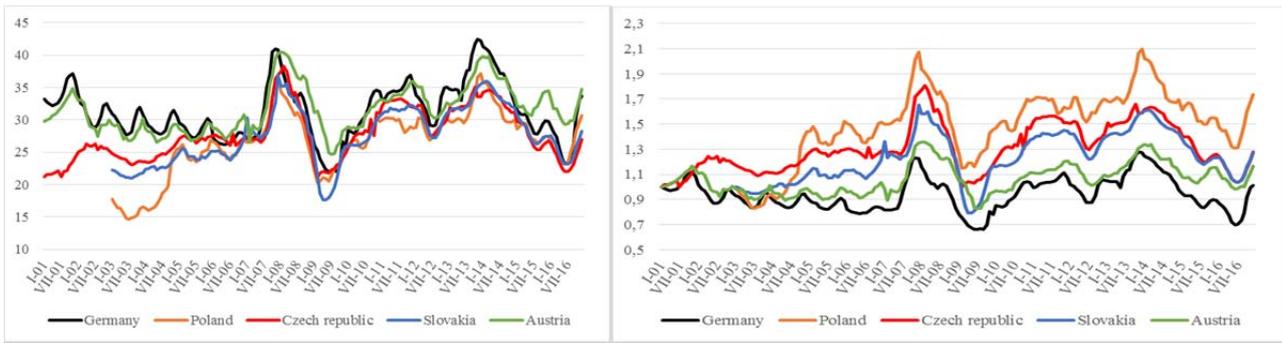
First, there are analysed milk farm prices in EUR/100kg in chosen EU countries, namely the Czech Republic, Slovakia, Poland, Austria and Germany. The price development is further evaluated through the milk farm price indices in these countries. Second, the development of butter producer prices in EUR/ton and their indices is described and evaluated in the given countries (except for Austria due to the low foreign trade with this commodity). Third, the analysis is focused on producer prices of Edam cheese in Germany, Czech Republic, Slovakia and Poland, i.e. development of prices and their indices. Finally, conclusions and consequences are deduced.

3 Research results

Firstly, there are analysed farm prices of milk where it is possible to see situation before entrance to European Union of Czech Republic, Poland and Slovakia. Analysis shows significantly lower farm prices in the Czech Republic, Poland and Slovakia before 2004 (see Figure 1, Graph No.1), i.e. the year of entrance to EU, then the prices in original countries represented by Germany and Austria. The equalizing of the milk farm prices started after the entrance to the EU, in the following period the development trends are basically comparable with the original two EU member states.

Indices of farm prices (see Figure 1, Graph No.2) make it possible to assess the development in more detail and to show that the price of milk in Poland, which was the lowest in comparison with other countries, grew most in comparison with 2001. Similarly, a high increase of milk farm prices was recorded in Slovakia and in the Czech Republic. Milk farm price indice in Germany and Austria oscillated around the value of 1, in Germany even with periods of moderate price decline.

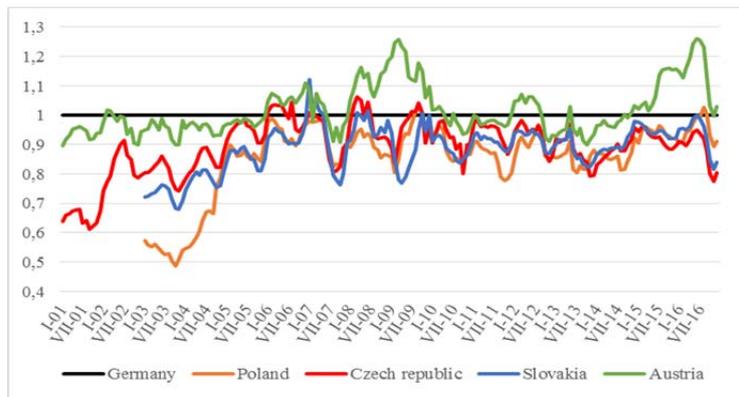
Figure 1 Milk farm prices in chosen EU countries in EUR/100kg in period 2001-2016 (Graph No.1) and Indices of milk farm prices in chosen EU countries in period 2001-2016 (1.00 = 2001) (Graph No.2)



Source: Eurostat; own processing

The evaluation of the development of milk farm price indices in relation to developments in Germany (see Figure 2) shows that the milk farm prices in the Czech Republic, Slovakia and Poland are lower than in Germany over the whole period of observation. The only country, which at some stages exceeds farm prices of Germany, is Austria.

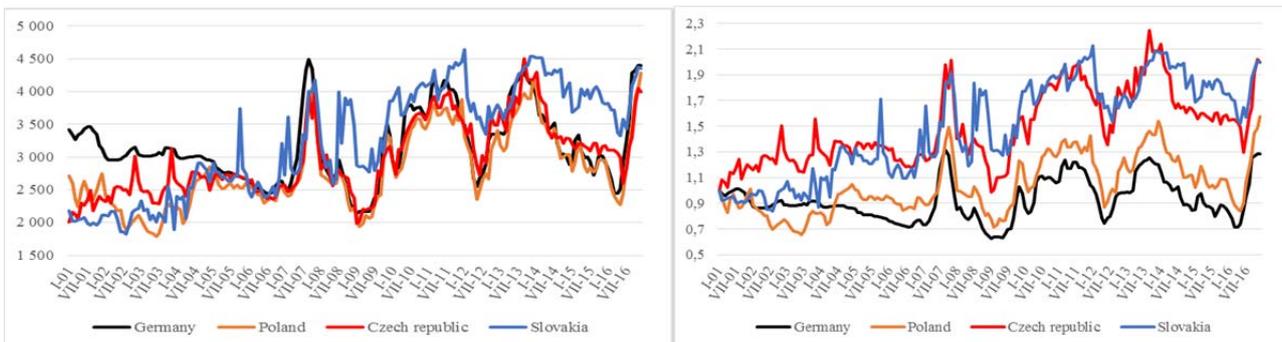
Figure 2 Indices of milk farm prices in Germany relation in 2001-2016 (1.00 = 2001)



Source: Eurostat; own processing

When evaluating the producer prices of butter in chosen EU countries, it is appropriate to exclude Austria from our research to small interconnection of international butter trade with the Czech Republic. As in the case of milk, before the entrance into the EU, the butter producer prices in the Czech Republic, Slovakia and Poland were lower than in Germany. At the time of entrance into the EU, however, these prices were already comparable, both in terms of growth in these three countries and of the decrease in Germany (see Figure 3, Graph No.1).

Figure 3 Producer prices of butter in chosen countries of EU in EUR/ton in period 2001-2016 (Graph No.1) and Indices of butter producer prices in chosen countries in period 2001-2016 (1.00 = 2001)



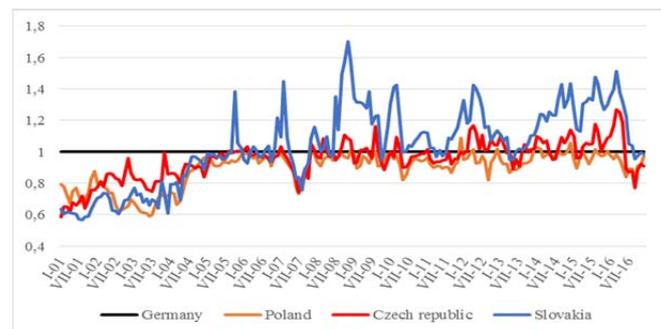
Source: Eurostat; own processing

After 2005, the butter producer prices in the Czech Republic, Slovakia and Poland started to develop in the same way as the butter producer prices in Germany. Since the middle of 2008, Slovak prices have partially changed and have been different from Germany, Poland and the Czech Republic. Butter producer prices in Slovakia are relatively higher than butter producer prices in other analysed countries. Significant butter producer prices growth is visible for all countries in 2016.

This development is seen more markedly in the assessment of butter producer price indices in individual countries (Figure 3, Graph No.2), confirming the assumption that, given the originally relatively lower prices (compared to Germany), butter producer prices grew most in Slovakia and in the Czech Republic. The overall development trend of the German butter producer prices can be assessed as declining, despite the fluctuations in 2007, 2011 and 2013. Similarly, the development of butter producer price indices in Poland can be characterized as decreasing.

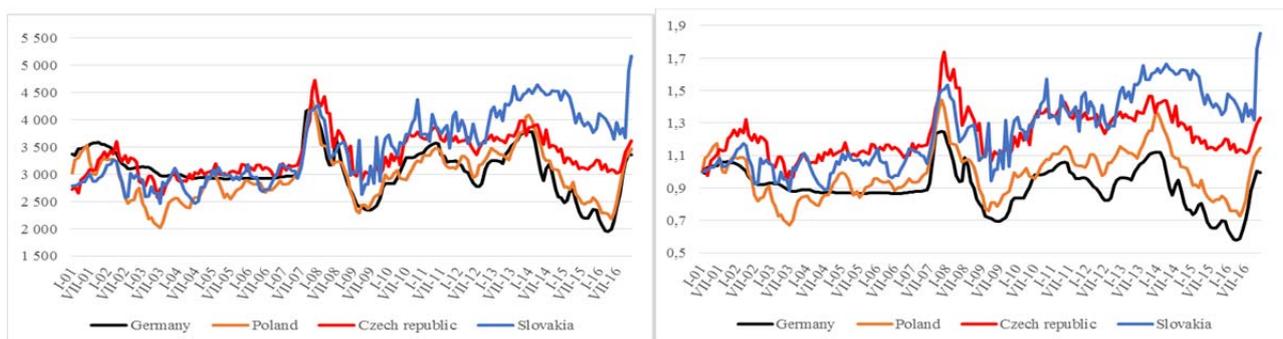
The development of butter producer price indices in Germany's relations is presented in Figure 4. It indicates that before the accession to the EU, butter producer prices in Poland, Slovakia and in the Czech Republic were about 40% lower than in Germany. In the next period, after the accession of these countries to the EU, as mentioned above, prices in Slovakia were significantly higher than prices in Germany (roughly by 40%). The Czech prices are oscillating around German prices more closely than the Polish prices, whose indices are rather at the level of Germany. This could indicate more interconnected market between Germany and Poland than between Germany and the Czech Republic at this commodity chain level.

Figure 4 Indices of butter producer prices in Germany relation in 2001-2016 (1.00 = 2001)



Source: Eurostat; own processing

Figure 5 Producer prices of Edam cheese in chosen EU countries in EUR/ton in period 2001-2016 (Graph No.1) and Indices of producer prices of Edam cheese in chosen EU countries, 1.00 = 2001, in period 2001-2016 (Graph No. 2)



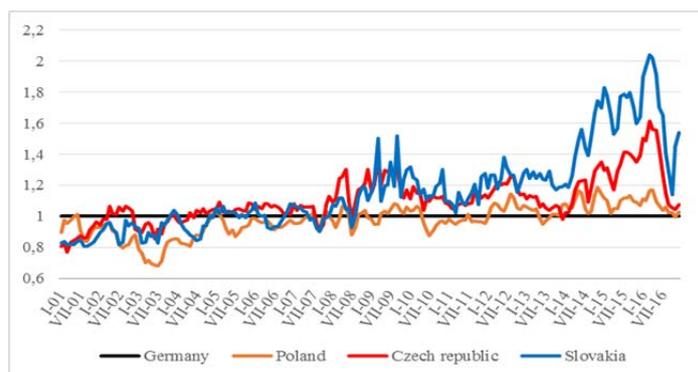
Source: Eurostat; own processing

Last part of our analysis was focused on producer prices development of Edam cheese in Germany, Czech Republic, Slovakia and Poland (similarly like in butter prices analysis we excluded Austria from the research). Figure 5 (Graph No.1) illustrates the development of producer prices of Edam in selected countries. The comparison shows that till 2007 the prices of Edam cheese in the Czech Republic and Germany were almost unchanged, the prices in Poland and Slovakia appear to be less stable. At the beginning of 2008, Edam producer prices jumped in all the countries under observation and subsequently followed a gradual decline. A significant difference in producer prices development occurs after 2013 when overall producer prices of Edam decreased. The most significant decrease was observed in Germany and Poland. A price reduction with no significant impact (and different price levels) occurs in the Czech Republic and

Slovakia. Approximately, from the middle of 2016, there is again a significant increase in Edam prices in all analysed countries with the lowest growth in the Czech Republic.

This assessment of price developments is confirmed also by the Graph No.2 in Figure 5, which reflects Edam producer price indices. It confirms that the producer prices of Edam cheese in Germany, unlike other countries, declined steadily until 2007, where the development was basically stable. Since 2007, following the significant fluctuation in the growth and subsequent fall in the producer prices of Edam, the producer price indices in Germany and Poland differ from the tendency of indices to predominately decline from developments in the Czech Republic (compensation, moderate growth, decline) and in Slovakia (strong growth, slight decrease). The same price development, i.e. increase, for all countries was observed in 2016.

Figure 6 Indices of Edam cheese producer prices in Germany relation in 2001-2016



Source: Eurostat; own processing

Figure 6 shows the evaluation of the Edam producer price trends in the Czech Republic, Slovakia and Poland in relation to the price levels in Germany. It is generally accepted that until the year 2007, the Edam prices of all countries oscillated around the German market price. However, since 2007, the producer prices of Edam in the Czech Republic, and especially in Slovakia, have started to deviate very significantly from prices in Germany (Slovak Edam producer prices were at their peak once higher than Germany prices and the Czech prices by more than half). Again, at this commodity chain level, it can be deduced that the producer prices in Germany and Poland are more related to each other than to the prices in the Czech Republic.

4 Conclusions

The aim of the paper was to evaluate the development of the pricing environment of the milk commodity vertical. The individual price levels has been decomposed in detail on the basis of the development of prices of selected products, which can be regarded as typical product representatives (milk, butter and Edam cheese). Through the development of tendencies, overall ties and context of price formation within the milk commodity chain the situation in the Czech Republic and comparison with the situation on the other EU market were described and evaluated.

During the preparation of the accession of the Czech Republic to the EU, i.e. during the first period under observation, the level of the basic raw milk prices, i.e. milk farm prices, was lower and the growth was observed in all new member states (not only in the Czech Republic) in comparison with the EU. On the other hand, on the German and Austrian milk markets in this time milk farm prices were declining slightly, which also favoured the interactions of these countries with each other in the dairy industry. The bilateral equalizing of the farm price level on the dairy market in the original and the new EU member states has already occurred in a short time after accession to the EU, which was reflected in the comparable development on the downstream vertical market for low-value processed milk products.

The reactions in the milk-butter commodity chain was partially different. In spite of the low unit price of the raw milk, the butter producer prices have been directly and quite considerably rising even before the EU accession. On the other hand, according to the development of producer prices in the downstream stage of the milk commodity chain, the assumption of the significant price increase of Edam cheese (as the processed milk product with the highest value added) was not confirmed due to the relatively high level of Edam producer prices in the previous periods.

The fundamental change, which influenced the further development of (not only) price conditions within the milk commodity chain, was the orderly increase in milk and dairy products demand in the global market in 2007. It was driven by several factors: the increase in milk and milk products demand in countries exporting oil (China, Brazil, Rus-

sia and India), also the consequences of weather fluctuations (such as extreme drought in Australia and the floods in Argentina), which led to a decrease in the quality of feed and hence lower milk production. After the depletion of dried milk and butter stocks, the prevalence of demand was reflected in world and European milk prices. Specifically, the prices of milk and dairy products in the Czech Republic increased in the short term by about 28%.

Shortly after the sharp price increases in 2007-2008, there was a significant drop in prices and a gradual recovery in price growth. It also contributed to the further formation of horizontal and vertical ties and prices on the EU milk market and directly influenced further developments in the Czech Republic. The decline in the farm prices milk feedstock with regard to production costs and the search for additional support and income options, in some cases, meant the withdrawal of primary producers from the milk market. In the Czech dairy industry, producer prices growth, with regard to the structure of ownership and support for the development of processing capacities, has not significantly contributed to the increase in production at this stage. However, due to the influence of the market power of the final parts of commodity chain, the transnational trade clusters were able to assert their position on the Czech market in the pricing policy, including influence on the choice of key suppliers of milk and dairy products. In general, it can be concluded that the price level on the dairy markets in the original EU member states and in the new EU member states has been balanced bilaterally. This aspect was reflected in a comparable price trends at the downstream market levels of the commodity chain under examination.

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